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030304

PROVISIONAL APPLICATION COVER SHEET

This is a request for filing a PROVISIONAL APPLICATION under 37 CFR 1.53 (b)(2).

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TITLE OF THE INVENTION (250 characters max)						
COMBINATIN THERAPY WITH GLATIRAMER ACETATE AND RILUZOLE FOR THE TREATMENT OF MULTIPLE SCLEROSIS						
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ENCLOSED APPLICATION PARTS (check all that apply)						
<input checked="" type="checkbox"/>	Specification	Number of Pages	27	<input type="checkbox"/>	Small Entity Statement	
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The invention was made by an agency of the United States Government or under a contract with an agency of the United States Government.



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Yes, the name of the U.S. Government agency and the Government contract number are: _____

Respectfully submitted,

SIGNATURE

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Date 3 / 3 / 04

REGISTRATION NO.
(if appropriate)

39,992

☐ Additional inventors are being named on separately numbered sheets attached hereto

PROVISIONAL APPLICATION FILING ONLY

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Liat Hayardeny et al.
Serial No.: Not Yet Known
Filed : Herewith
For : COMBINATION THERAPY WITH GLATIRAMER ACETATE AND
RILUZOLE FOR THE TREATMENT OF MULTIPLE SCLEROSIS

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**Application
for
United States Letters Patent**

To all whom it may concern:

Be it known that, we,

*Liat Hayardeny, Ety Klinger, Eran Blaugrund
have invented certain new and useful improvements in*

**COMBINATION THERAPY WITH GLATIRAMER ACETATE AND RILUZOLE FOR THE TREATMENT OF
MULTIPLE SCLEROSIS**

of which the following is a full, clear and exact description.

**COMBINATION THERAPY WITH GLATIRAMER ACETATE AND RILUZOLE
FOR THE TREATMENT OF MULTIPLE SCLEROSIS**

5

Throughout this application, various events are referenced in parenthesis. Full citations for these publications may be found listed in alphabetical order at the end of the specification immediately preceding the claims. The disclosures of these publications in their entireties are hereby incorporated by reference into this application in order to more fully describe the state of the art to which this invention pertains.

10

Field of the Invention

15 The subject invention relates to combination therapy for treating multiple sclerosis.

Background of the Invention

One of the more common neurologic diseases in human adults is multiple sclerosis. This condition is a chronic, inflammatory CNS disease characterized pathologically by demyelination. There are five main forms of multiple sclerosis: 1) benign multiple sclerosis; 2) relapsing-remitting multiple sclerosis (RR-MS); 3) secondary progressive multiple sclerosis (SP-MS); 4) primary progressive multiple sclerosis (PP-MS); and 5) progressive-relapsing multiple sclerosis (PR-MS). Benign multiple sclerosis is characterized by 1-2 exacerbations with complete recovery, no lasting disability and no disease progression for 10-15 years after the initial onset. Benign multiple sclerosis may, however, progress into other forms of multiple sclerosis. Patients suffering from RR-MS experience sporadic exacerbations or relapses, as well as periods of remission. Lesions and evidence of axonal loss may or may not be visible on MRI for patients with RR-MS. SP-MS may evolve from RR-MS. Patients afflicted with SP-MS have relapses, a diminishing degree of recovery during remissions, less frequent remissions and more pronounced neurological deficits than RR-MS

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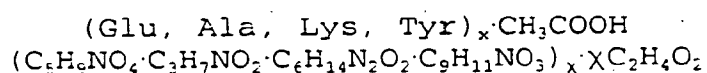
patients. Enlarged ventricles, which are markers for atrophy of the corpus callosum, midline center and spinal cord, are visible on MRI of patients with SP-MS. PP-MS is characterized by a steady progression of increasing neurological deficits without
5 distinct attacks or remissions. Cerebral lesions, diffuse spinal cord damage and evidence of axonal loss are evident on the MRI of patients with PP-MS. PR-MS has periods of acute exacerbations while proceeding along a course of increasing neurological deficits without remissions. Lesions are evident
10 on MRI of patients suffering from PR-MS (Multiple sclerosis: its diagnosis, symptoms, types and stages).

Researchers have hypothesized that multiple sclerosis is an autoimmune disease (Compston; Hafler and Weiner; Olsson). An
15 autoimmune hypothesis is supported by the experimental allergic encephalomyelitis (EAE) model of multiple sclerosis, where the injection of certain myelin components into genetically susceptible animals leads to T cell-mediated CNS demyelination (Parkman). Another theory regarding the pathogenesis of multiple
20 sclerosis is that a virus, bacteria or other agent, precipitates an inflammatory response in the CNS, which leads to either direct or indirect ("bystander") myelin destruction, potentially with an induced autoimmune component (Lampert; Martyn). Another experimental model of multiple sclerosis, Theiler's murine
25 encephalomyelitis virus (TMEV) (Dal Canto and Lipton; Rodriguez et al.), supports the theory that a foreign agent initiates multiple sclerosis. In the TMEV model, injection of the virus results in spinal cord demyelination.

30 Glatiramer acetate (GA), also known as Copolymer-1, has been shown to be effective in treating multiple sclerosis (MS) (Lampert, P.W.). Daily subcutaneous injections of glatiramer acetate (20 mg/injection) reduce relapse rates, progression of disability, appearance of new lesions by magnetic resonance
35 imaging (MRI), (Johnson, K.P. et al.) and appearance of "black

holes" (Filippi, M. et al.).

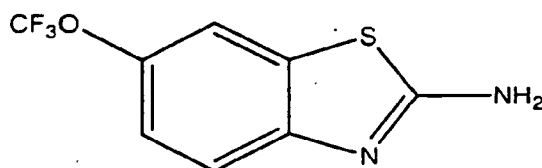
COPAXONE® is the brand name for a formulation containing glatiramer acetate as the active ingredient. Glatiramer acetate is approved for reducing the frequency of relapses in relapsing-remitting multiple sclerosis. Glatiramer acetate consists of the acetate salts of synthetic polypeptides containing four naturally occurring amino acids: L-glutamic acid, L-alanine, L-tyrosine, and L-lysine with an average molar fraction in COPAXONE® of 0.141, 0.427, 0.095 and 0.338, respectively. In COPAXONE®, the average molecular weight of the glatiramer acetate is 4,700-11,000 daltons. Chemically, glatiramer acetate is designated L-glutamic acid polymer with L-alanine, L-lysine and L-tyrosine, acetate (salt). Its structural formula is:



CAS - 147245-92-9.

The recommended dosing schedule of COPAXONE® for relapsing-remitting multiple sclerosis is 20 mg per day injected subcutaneously (Physician's Desk Reference, 2003; see also U.S. Patent Nos. 3,849,550; 5,800,808; 5,858,964; 5,981,589; 6,048,898; 6,054,430; 6,214,791; 6,342,476; and 6,362,161, all of which are hereby incorporated by reference).

Riluzole is a member of the benzothiazole class. Chemically, riluzole is 2-amino-6-trifluoromethoxy benzothiazole. Its molecular formula is $\text{C}_8\text{H}_5\text{F}_3\text{N}_2\text{OS}$ and its molecular weight is 234.2. Its structural formula is as follows:



and it has a molecular weight of 234.2 (Physician's Desk Reference, 2002).

5 RILUTEK® is a commercially available formulation of riluzole (2-amino-6-trifluoromethoxy benzothiazole), which is indicated for the treatment of patients with amyotrophic lateral sclerosis (ALS). RILUTEK® extends survival and/or time to tracheostomy. The recommended dose for RILUTEK® is 50 mg every 12 hours. RILUTEK® should be administered at least one hour before or at
10 least two hours after a meal (Physician's Desk Reference, 2003).

PCT Publication No. WO 01/95907 disclosed the results of testing 2-amino-6-trifluoromethoxy benzothiazole in an experimental autoimmune [sic] [allergic] encephalomyelitis (EAE), a murine
15 model of multiple sclerosis. The PCT Publication suggested that 2-amino-6-trifluoromethoxy benzothiazole might be useful for the treatment of multiple sclerosis, but did not test whether 2-amino-6-trifluoromethoxy benzothiazole is effective to alleviate symptoms of any specific form of multiple sclerosis in humans.

20 PCT Publication No. WO 00/74676 disclosed a study in which 2-amino-6-trifluoromethoxy benzothiazole alone, was administered to human patients afflicted with an unspecified form of multiple sclerosis. This PCT publication suggested that 2-amino-6-
25 trifluoromethoxy benzothiazole may be used to treat all forms of multiple sclerosis, and also suggests that 2-amino-6-trifluoromethoxy benzothiazole may be combined, with other agents useful in treating multiple sclerosis, such as interferons (especially type I interferons), steroids, pain
30 relievers, muscle relaxants, copaxone [sic] [COPAXONE®], immunosuppressants or anti-depressants. However, the experimental data in this PCT Publication showed the increase in T2 lesion load in the brain did not alter much under treatment, but the accumulation of hypointense lesions showed a trend
35 toward reduction. No effect on EDSS score was seen. Such data

is not supportive of the suggestion made and certainly doesn't suggest reducing frequency of relapses in relapsing-remitting multiple sclerosis patients.

5 The administration of two drugs to treat a given condition, such as a form of multiple sclerosis, raises a number of potential problems. In vivo interactions between two drugs are complex. The effects of any single drug are related to its absorption, distribution, and elimination. When two drugs are introduced
10 into the body, each drug can affect the absorption, distribution, and elimination of the other and hence, alter the effects of the other. For instance, one drug may inhibit, activate or induce the production of enzymes involved in a metabolic route of elimination of the other drug (Guidance for
15 Industry. In vivo drug metabolism/drug interaction studies - study design, data analysis, and recommendations for dosing and labeling). Thus, when two drugs are administered to treat the same condition, it is unpredictable whether each will complement, have no effect on, or interfere with, the
20 therapeutic activity of the other in a human subject.

Not only may the interaction between two drugs affect the intended therapeutic activity of each drug, but the interaction may increase the levels of toxic metabolites (Guidance for
25 Industry. In vivo drug metabolism/drug interaction studies - study design, data analysis, and recommendations for dosing and labeling). The interaction may also heighten or lessen the side effects of each drug. Hence, upon administration of two drugs to treat a disease, it is unpredictable what change will occur in
30 the negative side profile of each drug.

Additionally, it is accurately difficult to predict when the effects of the interaction between the two drugs will become manifest. For example, metabolic interactions between drugs may
35 become apparent upon the initial administration of the second

drug, after the two have reached a steady-state concentration or upon discontinuation of one of the drugs (Guidance for Industry. In vivo drug metabolism/drug interaction studies - study design, data analysis, and recommendations for dosing and labeling).

5

Thus, the success of one drug or each drug alone in an in vitro model, an animal model, or in humans, may not correlate into efficacy when both drugs are administered to humans.

10

In accordance with the subject invention, glatiramer acetate and 2-amino-6-trifluoromethoxybenzathiazole are effective in combination to treat a form of multiple sclerosis, specifically, relapsing-remitting multiple sclerosis.

Summary of the Invention

The subject invention provides a method of treating a subject afflicted with a form of multiple sclerosis comprising periodically administering to the subject an amount of
5 glatiramer acetate and an amount of 2-amino-6-trifluoromethoxybenzathiazole, wherein the amounts when taken together are effective to alleviate a symptom of the form of multiple sclerosis in the subject so as to thereby treat the
10 subject.

In addition, the subject invention provides a package comprising

- i) a first pharmaceutical composition comprising an amount of glatiramer acetate and a pharmaceutically
15 acceptable carrier;
- ii) a second pharmaceutical composition comprising an amount of 2-amino-6-trifluoromethoxybenzothiazole and a pharmaceutically acceptable carrier; and
- iii) instructions for use of the first and second
20 pharmaceutical compositions together to alleviate a symptom of a form of multiple sclerosis in a subject.

The subject invention further provides a pharmaceutical composition comprising an amount of glatiramer acetate and an
25 amount of 2-amino-6-trifluoromethoxybenzothiazole, wherein the amounts when taken together are effective to alleviate a symptom of a form of multiple sclerosis in a subject.

Detailed Description of the Invention

The subject invention provides a method of treating a subject afflicted with a form of multiple sclerosis comprising
5 periodically administering to the subject an amount of
glatiramer acetate and an amount of 2-amino-6-
trifluoromethoxybenzathiazole, wherein the amounts when taken
together are effective to alleviate a symptom of the form of
multiple sclerosis in the subject so as to thereby treat the
10 subject.

In one embodiment, the form of multiple sclerosis is relapsing-
remitting multiple sclerosis.

15 In another embodiment, the subject is a human being.

In a further embodiment, each of the amount of glatiramer
acetate when taken alone, and the amount of 2-amino-6-
trifluoromethoxybenzathiazole when taken alone is effective to
20 alleviate the symptom of the form of multiple sclerosis.

In an embodiment, either the amount of glatiramer acetate when
taken alone, the amount of 2-amino-6-
trifluoromethoxybenzathiazole when taken alone or each such
25 amount when taken alone is not effective to alleviate the
symptom of the form of multiple sclerosis.

In yet another embodiment, the symptom is the frequency of
relapses, the frequency of clinical exacerbation, or the
30 accumulation of physical disability.

In one embodiment, the amount of glatiramer acetate may be 10
to 80 mg; or 12 to 70 mg; or 14 to 60 mg; or 16 to 50 mg; or 18
to 40 mg; or 20 to 30 mg; or 20 mg. For each amount of
35 glatiramer acetate, the amount of 2-amino-6-

trifluoromethoxybenzathiazole may be 25 to 75 mg; or 35 to 65 mg; or 45 to 55 mg; or 50 mg.

Alternatively, the amount of glatiramer acetate may be in the
5 range from 10 to 600 mg/week; or 100 to 550 mg/week; or 150 to 500 mg/week; or 200 to 450 mg/week; or 250 to 400 mg/week; or 300 to 350 mg/week; or 300 mg/week.

In another embodiment, the amount of glatiramer acetate may be
10 in the range from 50 to 150 mg/day; or 60 to 140 mg/day; or 70 to 130 mg/day; or 80 to 120 mg/day; or 90 to 110 mg/day; or 100 mg/day.

Alternatively, the amount of glatiramer acetate may be in the
15 range from 10 to 80 mg/day; or 12 to 70 mg/day; or 14 to 60 mg/day; or 16 to 50 mg/day; or 18 to 40 mg/day; or 19 to 30 mg/day; or 20 mg/day.

In one embodiment, the periodic administration of glatiramer
20 acetate is effected daily.

In another embodiment, the periodic administration of glatiramer acetate is effected twice daily at one half the amount.

25 In an additional embodiment, the periodic administration of glatiramer acetate is effected once every 3 to 11 days; or once every 5 to 9 days; or once every 7 days; or once every 24 hours.

For each administration schedule of glatiramer acetate, the 2-
30 amino-6-trifluoromethoxybenzathiazole may be administered once every 8 to 16 hours; or once every 10 to 14 hours; or once every 12 hours.

In an embodiment, the periodic administration of 2-amino-6-
35 trifluoromethoxybenzathiazole is effected at least one hours

before or at least two hours after a meal.

5 In a further embodiment, the administration of the glatiramer acetate substantially precedes the administration of the 2-amino-6-trifluoromethoxybenzathiazole.

In an added embodiment, the administration of the 2-amino-6-trifluoromethoxybenzathiazole substantially precedes the administration of the glatiramer acetate.

10

In one embodiment, the glatiramer acetate and the 2-amino-6-trifluoromethoxybenzathiazole may be administered for a period of time of at least 4 days. In a further embodiment, the period of time may be 5 days to 5 years; or 10 days to 3 years; or 2 weeks to 1 year; or 1 month to 6 months; or 3 months to 4 months. In yet another embodiment, the glatiramer acetate and the 2-amino-6-trifluoromethoxybenzathiazole may be administered for the lifetime of the subject.

20

The administration of 2-amino-6-trifluoromethoxybenzathiazole or glatiramer acetate may each independently be oral, nasal, pulmonary, parenteral, intravenous, intra-articular, transdermal, intradermal, subcutaneous, topical, intramuscular, rectal, intrathecal, intraocular, buccal or by gavage. For 2-amino-6-trifluoromethoxybenzathiazole, the preferred route of administration is oral or by gavage. The preferred route of administration for glatiramer acetate is subcutaneous or oral. One of skill in the art would recognize that doses at the higher end of the range may be required for oral administration.

30

In one embodiment, the administration of the glatiramer acetate may be subcutaneous, intraperitoneal, intravenous, intramuscular, intraocular or oral and the administration of the 2-amino-6-trifluoromethoxybenzathiazole may be oral. In another embodiment, the administration of the glatiramer acetate

35

may be subcutaneous and the administration of the 2-amino-6-trifluoromethoxybenzathiazole may be oral.

The subject invention also provides a package comprising

- 5 i) a first pharmaceutical composition comprising an amount of glatiramer acetate and a pharmaceutically acceptable carrier;
- ii) a second pharmaceutical composition comprising an amount of 2-amino-6-trifluoromethoxybenzothiazole and
- 10 a pharmaceutically acceptable carrier; and
- iii) instructions for use of the first and second pharmaceutical compositions together to alleviate a symptom of a form of multiple sclerosis in a subject.

15 In an embodiment of the package, the amount of glatiramer acetate may be in the range from 10 to 600 mg; or 100 to 550 mg; or 150 to 500 mg; or 200 to 450 mg; or 250 to 400 mg; or 300 to 350 mg; or 300 mg.

20 In another embodiment of the package, the amount of glatiramer acetate may be in the range from 10 to 80 mg; or 12 to 70 mg; or 14 to 60 mg; or 16 to 50 mg; or 18 to 40 mg; or 19 to 30 mg; or 20 mg.

25 Alternatively, the amount of glatiramer acetate in the package may be in the range from 50 to 150 mg; or 60 to 140 mg; or 70 to 130 mg; or 80 to 120 mg; or 90 to 110 mg; or 100 mg.

30 For each amount of glatiramer acetate in the package, the amount of 2-amino-6-trifluoromethoxybenzathiazole in the package may be 25-75 mg; or 35-65 mg; or 45-55 mg; or 50 mg.

35 The subject invention further provides a pharmaceutical composition comprising an amount of glatiramer acetate and an amount of 2-amino-6-trifluoromethoxybenzothiazole, wherein the

amounts when taken together are effective to alleviate a symptom of a form of multiple sclerosis in a subject.

5 In one embodiment of the pharmaceutical composition, each of the amount of glatiramer acetate when taken alone and the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken alone is effective to alleviate the symptom of multiple sclerosis.

10 In another embodiment of the pharmaceutical composition, either of the amount of glatiramer acetate when taken alone, or the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken alone or each such amount when taken alone is not effective to alleviate the symptom of multiple sclerosis.

15 The subject invention further provides a pharmaceutical combination comprising separate dosage forms of an amount of glatiramer acetate and an amount of 2-amino-6-trifluoromethoxybenzothiazole, which combination is useful to alleviate a symptom of a form of multiple sclerosis in a
20 subject.

In an embodiment of the pharmaceutical combination, each of the amount of glatiramer acetate when taken alone and the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken alone is
25 effective to alleviate the symptom of multiple sclerosis.

In an additional embodiment of the pharmaceutical combination, either of the amount of glatiramer acetate when taken alone, the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken
30 alone or each such amount when taken alone is not effective to alleviate the symptom of multiple sclerosis.

In a further embodiment, the pharmaceutical combination may be for simultaneous, separate or sequential use to treat the form
35 of multiple sclerosis in the subject.

Formulations of the invention suitable for oral administration may be in the form of capsules, pills, tablets, powders, granules, or as a solution or a suspension in an aqueous or non-
5 aqueous liquid, or as an oil-in-water or water-in-oil liquid emulsion, or as an elixir or syrup, or as pastilles (using an inert base, such as gelatin and glycerin, or sucrose and acacia) and/or as mouth washes and the like, each containing a predetermined amount of the active compound or compounds.

10

In solid dosage forms of the invention for oral administration (capsules, tablets, pills, dragees, powders, granules and the like), the active ingredient(s) is mixed with one or more pharmaceutically acceptable carriers, such as sodium citrate or
15 dicalcium phosphate, and/or any of the following: fillers or extenders, such as starches, lactose, sucrose, glucose, mannitol, and/or silicic acid; binders, such as, for example, carboxymethylcellulose, alginates, gelatin, polyvinyl pyrrolidone, sucrose and/or acacia; humectants, such as
20 glycerol; disintegrating agents, such as agar-agar, calcium carbonate, calcium phosphate, potato or tapioca starch, alginic acid, certain silicates, and sodium carbonate; solution retarding agents, such as paraffin; absorption accelerators, such as quaternary ammonium compounds; wetting agents, such as,
25 for example, cetyl alcohol and glycerol monostearate; absorbents, such as kaolin and bentonite clay; lubricants, such as talc, calcium stearate, magnesium stearate, solid polyethylene glycols, sodium lauryl sulfate, and mixtures thereof; and coloring agents. In the case of capsules, tablets and pills, the
30 pharmaceutical compositions may also comprise buffering agents. Solid compositions of a similar type may also be employed as fillers in soft and hard-filled gelatin capsules using such excipients as lactose or milk sugars, as well as high molecular weight polyethylene glycols and the like.

35

Liquid dosage forms for oral administration of the active ingredients include pharmaceutically acceptable emulsions, microemulsions, solutions, suspensions, syrups and elixirs. In addition to the active ingredient(s), the liquid dosage forms
5 may contain inert dilutents commonly used in the art, such as, for example, water or other solvents, solubilizing agents and emulsifiers, such as ethyl alcohol, isopropyl alcohol, ethyl carbonate, ethyl acetate, benzyl alcohol, benzyl benzoate, propylene glycol, 1,3-butylene glycol, oils (in particular,
10 cottonseed, groundnut, corn, germ, olive, castor and sesame oils), glycerol, tetrahydrofuryl alcohol, polyethylene glycols and fatty acid esters of sorbitan, and mixtures thereof.

Suspensions, in addition to the active compounds, may contain
15 suspending agents such as ethoxylated isostearyl alcohols, polyoxyethylene sorbitol and sorbitan esters, microcrystalline cellulose, aluminum metahydroxide, bentonite, agar-agar and tragacanth, and mixtures thereof.

The pharmaceutical compositions, particularly those comprising
20 glatiramer acetate, may also include human adjuvants or carriers known to those skilled in the art. Such adjuvants include complete Freund's adjuvant and incomplete Freund's adjuvant. The compositions may also comprise wetting agents, emulsifying
25 and suspending agents, sweetening, flavoring, coloring, perfuming and preservative agents.

Glatiramer acetate may be formulated into pharmaceutical compositions with pharmaceutically acceptable carriers, such as
30 water or saline and may be formulated into eye drops. Glatiramer acetate may also be formulated into delivery systems, such as matrix systems.

This invention will be better understood from the Experimental
35 Details which follow. However, one skilled in the art will

readily appreciate that the specific methods and results discussed are merely illustrative of the invention as described more fully in the claims which follow thereafter.

Experimental Details

CLINICAL TRIAL OF RELAPSING-REMITTING MULTIPLE SCLEROSIS

The purpose of this trial is to compare the treatment of participants with relapsing-remitting multiple sclerosis (RR-MS) with COPAXONE® in combination with riluzole, with treatment with COPAXONE® in combination with placebo. The clinical objective is to evaluate the effect of treatments on MRI variables, clinical evaluations and immunological profile.

The design of this trial is a randomized, double-masked, 2-arm study of COPAXONE® in combination with riluzole versus COPAXONE® in combination with placebo for the treatment of relapsing-remitting multiple sclerosis. Twenty patients with RR-MS who meet the inclusion/exclusion criteria are enrolled per arm. Patients are randomized and receive either 20 mg SQ (subcutaneous) of COPAXONE® daily plus an oral dose of placebo daily or 20 mg SQ of COPAXONE® in combination with 50 mg riluzole every 12 hours. The riluzole is administered at least one hour before a meal or at least two hours after a meal.

Participant inclusion criteria are as follows: 1) men or women age 18 to 50 years; 2) RR-MS according to the guidelines from the International Panel on the Diagnosis of MS (McDonald et al.); 3) two separate documented relapses in the last two years; 4) active MRI with at least one gadolinium(Gd)-enhancing lesion in the MRI scan at screening; 5) EDSS (extended disability status scale) score between 1.0 and 5.0; 6) no relapse during screening period; 6) pre-treatment with COPAXONE® for at least three weeks, but no more than four weeks, prior to baseline visit; and 7) ability to understand and provide informed consent.

Participant exclusion criteria include the following: 1) normal brain MRI; 2) prior treatment with COPAXONE® other than the

scheduled three to four week pretreatment prior to baseline visit; 3) previous treatment with immunomodulating agents such as interferon beta or IVIg for the last 6 months prior to entry; 4) previous use of immunosuppressive agents (including azathioprine) in the last 12 months prior study entry; 5) steroid treatment one month prior to entry; 6) women not willing to practice reliable methods of contraception; 7) pregnant or nursing women; 8) life threatening or clinically significant diseases; 9) history of alcohol and drug abuse within 6 months prior enrollment; 10) known history of sensitivity to Gd; 11) uncontrolled and uncontrollable head movements (tremor, tics, etc.), muscle spasms, significant urinary urgency and claustrophobia, which will prevent the subject from lying still during the MRI scan; and 12) participation in other investigational therapy in the last 90 days.

MRI scans are performed during the screening visit (for eligibility) and at months 5, 10, 11 and 12. Full physical and neurological examinations are performed at screening, baseline and at months 2, 5, 9 and 12. Safety laboratory is performed at screening baseline and at months 1, 2, 5, 9 and 12. In addition, blood Ca²⁺ levels are monitored on the first and second months after baseline visit. The immunological profile is monitored at baseline and at months 1, 2, 4, and 5.

Primary efficacy endpoints include the following: 1) MRI variables as measured on months 10, 11, and 12; 2) total number and volume of T1 GD-enhanced lesions; 3) total number of new T2 lesions; and 4) total volume of T2 lesions. Secondary efficacy endpoints encompass the following: 1) changes in immunological parameters; and 2) PBMC proliferation in response to GA in vitro. The tertiary efficacy endpoints are as follows: 1) change from baseline in relapse rate and MS Functional Composite Score (MSFC); and 2) brain atrophy. Tolerability is evaluated with reference to the following: 1) percentage of subjects who

discontinue the study; and 2) percentage of subjects who
discontinue the study due to adverse events. Safety is
evaluated with reference to 1) adverse event frequency and
severity; 2) changes in vital signs and 3) clinical laboratory
5 values.

Patients treated with the COPAXONE® and riluzole combination
exhibit a comparable or greater reduction in T1 and T2 Gd-
enhancing lesions and other lesions, as compared to the group
10 receiving COPAXONE® and placebo. Additionally, the group
receiving the COPAXONE® and riluzole combination demonstrate a
comparable or greater reduction in the number of relapses per
year as compared with the group receiving COPAXONE® and placebo.

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What is claimed:

1. A method of treating a subject afflicted with a form of multiple sclerosis comprising periodically administering to the
5 subject an amount of glatiramer acetate and an amount of 2-amino-6-trifluoromethoxybenzathiazole, wherein the amounts when taken together are effective to alleviate a symptom of the form of multiple sclerosis in the subject so as to thereby treat the subject.

10 2. The method of claim 1, wherein the form of multiple sclerosis is relapsing-remitting multiple sclerosis.

15 3. The method of claim 1, wherein the subject is a human being.

4. The method of claim 1, wherein each of the amount of glatiramer acetate when taken alone, and the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken alone is effective to alleviate the symptom of the form of multiple sclerosis.

20 5. The method of claim 1, wherein either the amount of glatiramer acetate when taken alone, the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken alone or each such amount when taken alone is not effective to alleviate the
25 symptom of the form of multiple sclerosis.

6. The method of claim 1, wherein the symptom is the frequency of relapses, the frequency of clinical exacerbation, or the accumulation of physical disability.

30 7. The method of claim 1, wherein the amount of glatiramer acetate is in the range from 10 to 600 mg/week.

35 8. The method of claim 7, wherein the amount of glatiramer acetate is 300 mg/week.

9. The method of claim 1, wherein the amount of glatiramer acetate is in the range from 50 to 150 mg/day.

5 10. The method of claim 9, wherein the amount of glatiramer acetate is 100 mg/day.

11. The method of claim 1, wherein the amount of glatiramer acetate is in the range from 10 to 80 mg/day.

10 12. The method of claim 11, wherein the amount of glatiramer acetate is 20 mg/day.

13. The method of claim 1, wherein the periodic administration of glatiramer acetate is effected daily.

15 14. The method of claim 1, wherein the periodic administration of glatiramer acetate is effected twice daily at one half the amount.

20 15. The method of claim 1, wherein the periodic administration of glatiramer acetate is effected once every 5 to 9 days.

25 16. The method of claim 1, wherein the periodic administration of 2-amino-6-trifluoromethoxybenzathiazole is effected at least one hours before or at least two hours after a meal.

17. The method of claim 1, wherein the administration of the glatiramer acetate substantially precedes the administration of the 2-amino-6-trifluoromethoxybenzathiazole.

30 18. The method of claim 1, wherein the administration of the 2-amino-6-trifluoromethoxybenzathiazole substantially precedes the administration of the glatiramer acetate.

35 19. The method of claim 1, wherein the administration of the

glatiramer acetate is effected subcutaneously, intraperitoneally, intravenously, intramuscularly, intraocularly or orally and the administration of the 2-amino-6-trifluoromethoxybenzathiazole is effected orally.

5

20. The method of claim 19, wherein the administration of the glatiramer acetate is effected subcutaneously and the administration of the 2-amino-6-trifluoromethoxybenzathiazole is effected orally.

10

21. A package comprising

- i) a first pharmaceutical composition comprising an amount of glatiramer acetate and a pharmaceutically acceptable carrier;
- 15 ii) a second pharmaceutical composition comprising an amount of 2-amino-6-trifluoromethoxybenzothiazole and a pharmaceutically acceptable carrier; and
- iii) instructions for use of the first and second pharmaceutical compositions together to alleviate a symptom of a form of multiple sclerosis in a subject.

20

22. The package of claim 21, wherein the amount of glatiramer acetate is 300 mg.

25

23. The package of claim 21, wherein the amount of glatiramer acetate is 20 mg.

30

24. A pharmaceutical composition comprising an amount of glatiramer acetate and an amount of 2-amino-6-trifluoromethoxybenzothiazole, wherein the amounts when taken together are effective to alleviate a symptom of a form of multiple sclerosis in a subject.

35

25. The pharmaceutical composition of claim 24, wherein each of the amount of glatiramer acetate when taken alone and the amount

of 2-amino-6-trifluoromethoxybenzathiazole when taken alone is effective to alleviate the symptom of multiple sclerosis.

26. The pharmaceutical composition of claim 24, wherein either of the amount of glatiramer acetate when taken alone, or the amount of 2-amino-6-trifluoromethoxybenzathiazole when taken alone or each such amount when taken alone is not effective to alleviate the symptom of multiple sclerosis.

27. A product containing glatiramer acetate and 2-amino-6-trifluoromethoxybenzathiazole as a combined preparation for simultaneous, separate or sequential use in therapy.

28. A product containing glatiramer acetate and 2-amino-6-trifluoromethoxybenzathiazole as a combined preparation for simultaneous, separate or sequential use in therapy of multiple sclerosis.

29. The use glatiramer acetate and 2-amino-6-trifluoromethoxybenzathiazole for the manufacture of a combined preparation medicament for the treatment of multiple sclerosis, wherein glatiramer acetate and 2-amino-6-trifluoromethoxybenzathiazole are administered simultaneously, separately or sequentially.

30. The product or use of any one of claims 27-29, wherein the use is sequential at an interval of up to 24 hours.

31. The product or use of claims 30, wherein the interval is from 1 to 12 hours.

32. The product or use of claims 31, wherein the interval is 2

hours.

33. The product or use of any one of claims 27-29, wherein the use is separate.

34. The product or use of any one of claims 27-29, wherein the use is simultaneous.

35. The use 2-amino-6-trifluoromethoxybenzathiazole for the manufacture of a medicament for the treatment of multiple sclerosis in a patient who is being treated with glatiramer acetate for the treatment of multiple sclerosis.

36. The use 2-amino-6-trifluoromethoxybenzathiazole for the manufacture of a medicament for the treatment of multiple sclerosis in a patient population that is being treated with glatiramer acetate for the treatment of multiple sclerosis.

37. The use 2-amino-6-trifluoromethoxybenzathiazole for the manufacture of a medicament for enhancing the treatment of multiple sclerosis in a patient who is being treated with glatiramer acetate for the treatment of multiple sclerosis.

COMBINATION THERAPY WITH GLATIRAMER ACETATE AND RILUZOLE
FOR THE TREATMENT OF MULTIPLE SCLEROSIS

Abstract of the Disclosure

5 The subject invention provides a method of treating a subject
afflicted with a form of multiple sclerosis comprising periodically
administering to the subject an amount of glatiramer acetate and an
amount of 2-amino-6-trifluoromethoxybenzathiazole, wherein the
amounts when taken together are effective to alleviate a symptom of
10 the form of multiple sclerosis in the subject so as to thereby
treat the subject. The subject invention also provides a package
comprising glatiramer acetate, 2-amino-6-
trifluoromethoxybenzothiazole and instructions for use of the
together to alleviate a symptom of a form of multiple sclerosis in
15 a subject. Additionally, the subject invention provides a
pharmaceutical composition comprising an amount of glatiramer
acetate and an amount of 2-amino-6-trifluoromethoxybenzothiazole,
wherein the amounts when taken together are effective to alleviate
a symptom of a form of multiple sclerosis in a subject. The
20 subject invention further provides a pharmaceutical combination
comprising separate dosage forms of an amount of glatiramer acetate
and an amount of 2-amino-6-trifluoromethoxybenzothiazole, which
combination is useful to alleviate a symptom of a form of multiple
sclerosis in a subject.